

Region 10 Algebra Forum MaTHink

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*Lesson Study and The Common
Core State Standards*

Who we are...

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 - Middle School Math Teacher
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K-W

(the L will come later!)

- What do you know about Lesson Study?
- What do you know about CCSS?
- What is Lesson Study?
- What are the CCSS?

Agenda

- Common Core State Standards for Mathematics
- Let's do some math!
- Lesson Study



8 Standards for Mathematical Practice

1. Make sense of complex problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure
8. Look for and express regularity in repeated reasoning.

CCSS-M Learning Progressions

	K	1	2	3	4	5	6	7	8	HS
Counting & Cardinality										
Number and Operations in Base Ten						Ratios & Proportional Relationships			Number & Quantity	
					Number and Operations - Fractions		The Number System			
Operations and Algebraic Thinking						Expressions & Equations			Algebra	
								Functions	Functions	
Geometry										Geometry
Measurement and Data						Statistics and Probability			Statistics and Probability	

Let's Do Some Math!!!

Legs



There are 100 chickens and rabbits altogether. The chickens have 80 more legs than the rabbits. How many chickens and how many rabbits are there?

(Make sure to do this activity with the students' view and understandings in mind. Pay particular attention to any possible misconceptions that could occur in students' learning)

Table Activity

With your table group, discuss:

- 1) What grade level is this problem?
- 2) What mathematical knowledge is necessary?
- 3) What mathematical strategies were utilized?
- 4) Which SMP's were addressed?
- 5) How would you scaffold this problem?

PD anyone????



Professional Development

- Focused on Mathematical Content (familiar and less familiar)
- Extended investigation into the Mathematics
- Explicit Reflection on Practices (as well as the Math) throughout
- Translation Back to the Classroom

Juliana Belding, Harvard University

A Professional Development Model for the CCSS-M

National Staff Development Council (Darling-Hammond et al., 2009) entitled, "Professional Learning in the Learning Profession: A Status Report on Teacher Development in the United States and Abroad"

- 1) Professional development should be intensive, ongoing, and connected to practice;
- 2) Professional development should focus on student learning and address the teaching of specific content;
- 3) Professional development should align with school improvement priorities and goals;
- 4) Professional development should build strong working relationships among teachers.

Three Levels of Teaching

Level 1: Teachers can tell students important basic ideas of mathematics such as facts, concepts, and procedures.

Level 2: Teachers can explain the meanings and reasons of the important basic ideas of mathematics in order for students to understand them.

Level 3: Teachers can provide students opportunities to understand these basic ideas, and support their learning so that the students become independent learners.

Level 3 is a way to address the standards for mathematical practice through Lesson Study

Takashi, A (2011)

History of Lesson Study

- Originated in Japan over 100 years ago
 - Most common form of Professional Development
 - Student-Centered teaching
- In the United States
 - Mokato Yashida, Dissertation
 - James Stigler and James Hiebert, The Teaching Gap 1999
 - Catherine Lewis, scholarly article 1998

Why Lesson Study?

- If we truly desire to improve our teaching, we must eventually turn our focus to student learning.
- Lesson Study is centered on student learning and meeting student needs as they progress through mathematics.
- Lesson Study allows teachers to focus on student learning through collaborative planning, lesson delivery, observation and reflection.

Lesson Study is Unique because...

- **Teacher-led**
- Teachers are the researchers in Lesson Study
- Informed by outside expertise through knowledgeable others
- Focused on subject content in the context of student learning
- Conducted with a common overarching goal (Research Goal)

Lesson Study is NOT...

- **Teacher training**
- About creating a perfect lesson
- Done in isolation
- Doing just one lesson study cycle
- About teacher evaluation
- Agenda driven
- Only for math teachers

Who is involved...

Teachers:

- Gather as a team to work together long-term
- 3 - 8 teachers (suggested)
- Teach a common subject but not necessarily a common grade level
- Lead in building research lesson

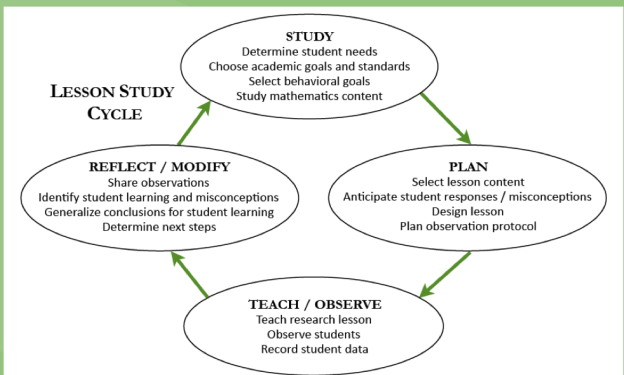
Facilitator:

- Can be part of the team long-term
- Maintain coherence in planning
- Establish an environment of collaboration
- Optional

Knowledgeable Others:

- Can be called in by the team to add value to the LS
- Instructional coaches, university professors, content experts, etc.
- Provide a fresh perspective about content and pedagogy
- Optional

The Lesson Study Cycle



Study

- After deciding on an overall research goal
- Decide on academic goals and standards
- Teachers increase content knowledge as they study, solve, and discuss problems within those standards

Plan

- Design the assessment
- Design the lesson
- Explore outside resources (textbooks, journals, websites, etc.)
- Ask the experts
- Anticipate student responses / misconceptions
- Decide on observation protocol

Teach/Observe

- One (usually) teacher delivers the lesson.
- All other adults in the classroom observe the students without interacting with them.
- It is essential that all observers remember that they are NOT observing the teacher; they are observing students' learning and responses to the content presented in lesson!
- Every observer has a specific focus (content, ELs, motivation, engagement, murmurs, etc.)

Reflect/Modify

- Review collected data, reflect, revise, then re-teach the lesson.
- The teacher starts this discussion. Then the observers share their findings.
- Discussions are focussed on student learning.
- The heart of lesson study is the reflect/modify stage.
- Once the lesson has been revised, it's time to teach it again!

Start All Over Again...

- This cycle should be repeated more than once.
- The re-teaching can occur the same day or much later in the school year.

Lesson Study Research Goal

- Think about the profile of a successful learner.
- What characteristics/behaviors would they have that contribute to their success?
- What are, "the personal qualities that contribute to the student's motivation and learning?"

- Think about one of your classes.
- What characteristics and/or behaviors do your students possess? Describe patterns of behavior you see.

Using the questions from these two columns as a guide, discuss a few possible areas that you would like to focus on if you were to participate in a lesson study.

Our Current Research Goals

Content Goal: Students will investigate the properties of functions through the use of multiple representations (algebraically, graphically, numerically in a table, and a verbal description or application problem). (from pg. 57 in CaCCSS, F-IF 9)

Behavioral Goal: Students will develop understanding and utilize procedural knowledge in order to strengthen their adaptive reasoning.

Noyce Fellows Research Lessons

Graphing and Writing Linear Equations	Fall 2010
Triangle Congruence	Winter 2011
Combinations and Permutations	Spring 2011
"Farmville" - Maximize Area	Fall 2011
"Curves Ahead"	Spring 2012
"Transformers-The Bright Side of Linear Functions"	Fall 2012

Noyce Fellows' Comment

The biggest change to my instruction this year has been a paradigm shift from teaching students *what* to think to teaching students *how* to think. This idea of teaching the *how* and not the *what* has come as a result of many of the Noyce events, in particular, lesson study. In lesson study, we have focused on student learning. We have found that high levels of student learning in mathematics is closely related to their adaptive reasoning, as defined by the National Research Council. To become adept at adaptive reasoning students must be taught *how*. They must constantly be taught to think logically, reflect, explain, and justify. I cannot produce students who have adaptive reasoning by simply teaching them the *what*. Therefore, I will continue to help my students become highly skilled at adaptive reasoning by teaching them *how* to think.

- Chris

Noyce Fellows' Comments

Lesson study ideas and concepts are implemented in my classroom teaching. I used ideas of engagement from other teachers. For example, the use of whiteboards should be quick feedback. I am able to get students ready for future math classes to think outside the box through holistic problems. My lessons become more purposeful and meaningful to the students because I am able to show my students concepts that are applied to the real world.

- Phi

Noyce Fellows' Comment

One of the biggest benefits of participating in lesson study is being able to observe how students learn as a teacher. Even though this is not my first time I observed student learning from another teacher, most of that observation happened during my participation in a credentialing program. I have also observed other teachers at my site teach, however, each time I observed I focused more on what the teacher was doing rather than what the students were doing. Participating in lesson study has given me the opportunity to roam a classroom and focus on what the students are writing, answering, and even mumbling while the teacher is teaching. After the lesson is done, we discuss what occurred with the students, make changes to address any opportunities that are identified, and re-teach the lesson to see if the changes are effective. I have never participated in anything that has given me the opportunity to get this kind of feedback and collaboration.

- Angel

What Teachers Say

- "The learning was so much more effective this time, it wasn't about teaching, it was about learning."
- "This is the first time 'collaboration time' has been true to its title!"
- "We are only as effective as our level of understanding. We have to keep pushing ourselves into the 'why', the 'how come', that's the challenge."

What Research Says

- Lesson study improves instruction through the refinement of lesson plans.
- Lesson study strengthens three pathways to instructional improvement: teachers' knowledge, teachers' commitment and community, and learning resources.

Lewis, C., Perry, R., & Murata, A.
Educational Researcher, April 2006

Against "Answer Getting"

Correct answers are essential... but they're part of the process, they're not the product. The product is the math the kids walk away with in their heads...

- Phil Daro

<http://serpmedia.org/daro-talks/>

How can you start engaging in lesson study?

- Read "Teaching Gap" by James W. Stigler and James Hiebert
- Google Search
- Talk with other teachers at your site
- Talk with your administrators
- Attend a local conference
- Chicago Lesson Study Group <http://www.lessonstudysgroup.net/>
- Inside Mathematics
- <http://insidemathematics.org/index.php/home>

K-W-L

- What did you **learn** about Lesson Study?
- What did you **learn** about CCSS?

Questions?



Contact Us

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Resources

[Supporting Implementation of the Common Core State Standards for mathematics](#)

[Designing Professional Development around the Common Core Standards for Mathematical Practice](#)

[Differences in how level 1, level 2, and level 3 teachers use a textbook](#)

[Overview of Lesson Study in Japan](#)